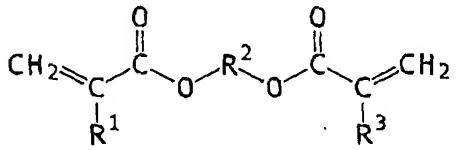
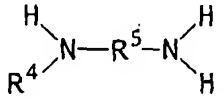
CLAIMS:

1. A method for preparing a poly(amino ester) compound having a polymer backbone comprising at least one secondary amine linkage and at least one tertiary amine linkage in said polymer backbone, said method comprising reacting a bis(acrylate ester) monomer of formula XI:



with a diamine monomer of formula XII:



wherein:

each of R^1 and R^3 is independently hydrogen, hydroxyl, halide, thiohydroxyl or hydrocarbyl;

R^2 is unsubstituted or substituted C_{1-30} alkylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S; unsubstituted or substituted C_{2-30} alkenylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S; or unsubstituted or substituted C_{2-30} alkynylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S;

R^5 is:

(i) unsubstituted or substituted C_{1-30} alkylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S; unsubstituted or substituted C_{2-30} alkenylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S; or unsubstituted or substituted C_{2-30} alkynylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S; or

(ii) $-R^6-M-R^7-$, where

R^6 is bonded to $-N(R^4)-$ and is unsubstituted or substituted C_{1-6} alkylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S, or unsubstituted or substituted C_{2-6} alkenylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S;

M is CH or N; and

R^7 is unsubstituted or substituted C_{1-28} alkylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S; unsubstituted or substituted C_{2-28} alkenylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S; or unsubstituted or substituted C_{2-28} alkynylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S;

R^4 is

(i) hydrocarbyl; or

(ii) when R^5 is $-R^6-M-R^7-$, R^4 is also bonded to M and is unsubstituted or substituted C_{1-6} alkylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S, or unsubstituted or substituted C_{2-6} alkenylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S, and R^4, M, R^6 and the nitrogen atom to which R^4 and R^6 are bonded form a saturated or unsaturated four- to twelve-membered heterocyclic ring,

with the proviso that R^1, R^2, R^3, R^4 and R^5 cannot have a primary amino group, a secondary amino group, or a C=C double bond conjugated to a carbonyl group.

2. The method of claim 1 further comprising the step of reacting the poly(amino ester) compound with an end-capping reagent.

3. The method of claim 1, wherein said bis(acrylate ester) and said diamine are present in a molar ratio in a range of from about 4:1 to about 1:4.

4. The method of claim 3, wherein said bis(acrylate ester) and said diamine are present in a molar ratio in a range of from about 2:1 to about 1:2.

5. The method of claim 1, wherein said step of reacting is carried out in the presence of an organic solvent.

6. The method of claim 5, wherein said organic solvent is selected from the group consisting of: tetrahydrofuran, diethyl ether, glyme, hexanes, methanol,

ethanol, isopropanol, methyl chloride, chloroform, carbon tetrachloride, and benzene.

7. The method of claim 1, wherein said step of reacting is carried out at a temperature in a range from between about -20°C and about 100°C.

8. The method of claim 7, wherein said step of reacting is carried out at a temperature in a range from between about 10°C and about 70°C.

9. The method of claim 8, wherein said step of reacting is carried out at a temperature in a range from between about 20°C and about 50°C.

10. The method of claim 1, wherein said bis(acrylate ester) is selected from the group consisting of: 1,4-butanediol diacrylate, 1,4-butanediol dimethacrylate, 1,2-ethanediol diacrylate, 1,6-hexanediol diacrylate, 2,5-hexanediol diacrylate, poly(ethyl glycol) diacrylate, ethylene diacrylate, and 1,3-propanediol diacrylate.

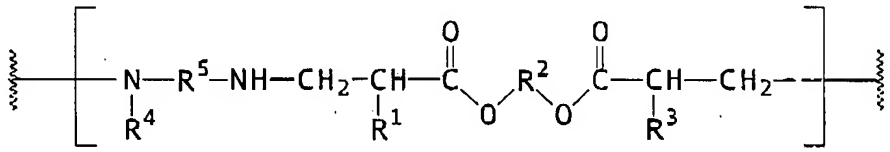
11. The method of claim 10, wherein said bis(acrylate ester) is 1,4-butanediol diacrylate.

12. The method of claim 1, wherein said diamine is selected from the group consisting of: 1-(2-aminoethyl)piperazine, N-methyl ethylenediamine, 4-(aminomethyl)piperidine, 4-aminopiperidine, 3-amino-pyrrolidine, N-ethylethylenediamine, N-methyl-1,3-propanediamine, N-isopropylethylenediamine, N-hexylethylenediamine, N-butylethylenediamine, N-(2-hydroxypropyl)ethylenediamine, and N, N-diethyl-diethylene triamine.

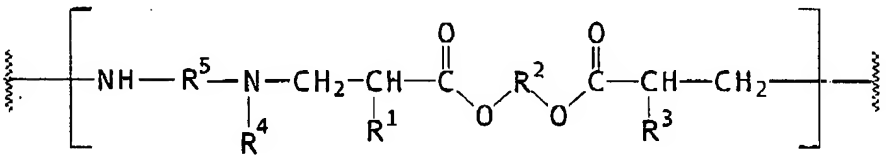
13. The method of claim 12, wherein said diamine is 1-(2-aminoethyl)piperazine.

14. A poly(amino ester) compound having a polymer backbone having at least one secondary amine linkage and at least one tertiary amine linkage in said polymer backbone.

15. The compound of claim 14, wherein said compound comprises 1 to 2000 linear units independently selected from the group consisting of a linear unit of formula I:



and a linear unit of formula II: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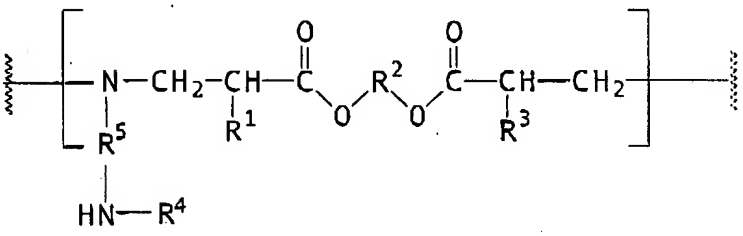
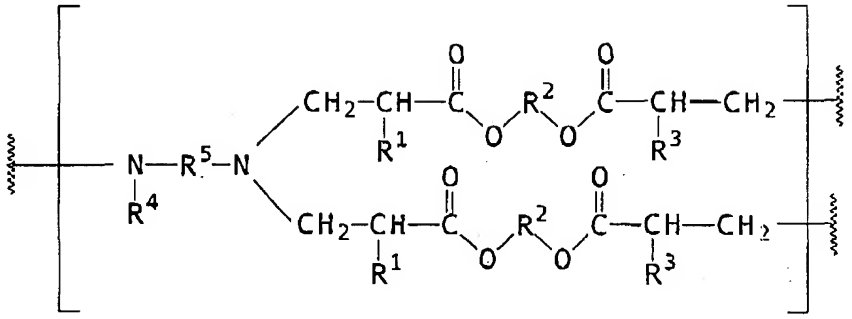
and optionally comprises one or more linear units of formula III:


;

and optionally comprises one or more branched units of formula IV:



;

wherein:

each of R^1 and R^3 is independently hydrogen, hydroxyl, halide, thiohydroxyl or hydrocarbyl;

R^2 is unsubstituted or substituted C_{1-30} alkylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S; unsubstituted or substituted C_{2-30} alkenylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S; or unsubstituted or substituted C_{2-30} alkynylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S;

R^5 is:

(i) unsubstituted or substituted C_{1-30} alkylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S; unsubstituted or substituted C_{2-30} alkenylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S; or unsubstituted or substituted C_{2-30} alkynylene

optionally containing one or more heteroatoms selected from the group consisting of N, O and S; or

(ii) $-R^6-M-R^7-$, where

R^6 is bonded to $-N(R^4)-$ and is unsubstituted or substituted C_{1-6} alkylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S, or unsubstituted or substituted C_{2-6} alkenylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S;

M is CH or N; and

R^7 is unsubstituted or substituted C_{1-28} alkylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S; unsubstituted or substituted C_{2-28} alkenylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S; or unsubstituted or substituted C_{2-28} alkynylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S;

R^4 is:

(i) hydrocarbyl; or

(ii) when R^5 is $-R^6-M-R^7-$, R^4 is also bonded to M and is unsubstituted or substituted C_{1-6} alkylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S, or unsubstituted or substituted C_{2-6} alkenylene optionally containing one or more heteroatoms selected from the group consisting of N, O and S; and R^4, M, R^6 and the nitrogen atom to which R^4 and R^6 are

bonded form a saturated or unsaturated four- to twelve-membered heterocyclic ring,

with the proviso that R^1, R^2, R^3, R^4 and R^5 cannot have a primary amino group, a secondary amino group, or a C=C double bond conjugated to a carbonyl group.

16. The compound of claim 15, wherein R^1 and R^3 are both hydrogen.

17. The compound of claim 15, wherein R^2 is an unsubstituted or substituted C_{2-6} alkylene.

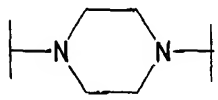
18. The compound of claim 17, wherein R^2 is butylene.

19. The compound of claim 17, wherein R^2 is ethylene.

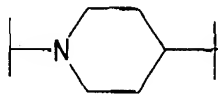
20. The compound of claim 17, wherein R^2 is propylene.

21. The compound of claim 15, wherein R^5 is $-R^6-M-R^7-$, R^4 is also bonded to M, and R^4, M, R^6 and the nitrogen atom to which R^4 and R^6 are bonded form a saturated or unsaturated four- to twelve-membered heterocyclic ring.

22. The compound of claim 21, wherein R^7 is ethylene, and R^4, M, R^6 and the nitrogen atom to which R^4 and R^6 are bonded form:



23. The compound of claim 21, wherein R^7 is methylene, and R^4, M, R^6 and the nitrogen atom to which R^4 and R^6 are bonded form:



24. The compound of claim 15, wherein R^5 is a C_{1-6} alkylene.

25. The compound of claim 15, wherein R^4 is methylene.

26. The compound of claim 15, wherein R^4 is selected from the group consisting of ethylene, propylene, isopropylene, 2-hydroxypropylene, 3-hydroxypropylene, butylene, hexylene, and N, N-diethylamino ethylene.

27. The compound of claim 15, wherein said compound has a molecular weight of between about 500 g/mol and 600,000 g/mol.

28. A pharmaceutical composition comprising a poly(amino ester) compound as defined in claim 15 and a bioactive agent.

29. The composition of claim 28, wherein said bioactive agent has a net negative charge or is electrically neutral.

30. The composition of claim 29, wherein said bioactive agent is selected from the group consisting of a DNA molecule, an RNA molecule, a protein, and a drug.

31. The composition of claim 30, wherein said bioactive agent is a DNA molecule.

32. The composition of claim 30, wherein said bioactive agent is a drug.

33. The composition of claim 30, wherein said bioactive agent is a protein.

34. The pharmaceutical composition of claim 30 in freeze-dried form.

35. The pharmaceutical composition of claim 30 in spray-dried form.

36. A method of preparing a composition of claim 28, the method comprising:

solubilizing the poly(amino ester) compound as defined in claim 14 in an aqueous buffer to obtain a protonated form of said poly(amino ester) compound; and

admixing said protonated form of said compound with a bioactive agent.

37. The method of claim 36, wherein said bioactive agent has a net negative charge or is electrically neutral.

38. The method of claim 37, wherein said bioactive agent is selected from the group consisting of a DNA molecule, an RNA molecule, a protein, and a drug.

39. The method of claim 38, wherein said bioactive agent is a DNA molecule.

40. The method of claim 38, wherein said bioactive agent is a drug.

41. The method of claim 38, wherein said bioactive agent is a protein.

42. The method of claim 36, further comprising:

freeze-drying the admixture.

43. The method of claim 36, further comprising:

spray-drying the admixture.

44. A composition for transfecting a cell, the composition comprising a DNA molecule or a salt thereof complexed with a compound according to claim 15 or a salt thereof, wherein said compound is in a protonated form.

45. A method of transfecting a cell, the method comprising contacting the cell with a composition as defined in claim 44.

46. A pharmaceutical composition for treating a patient in need of gene therapy, the composition comprising a DNA molecule or a salt thereof and a compound according to claim 15 or a salt thereof, wherein said compound is in protonated form and carries a net positive charge.